Capability Roadmaps Community Workshop

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Capability Roadmaps Development Lead
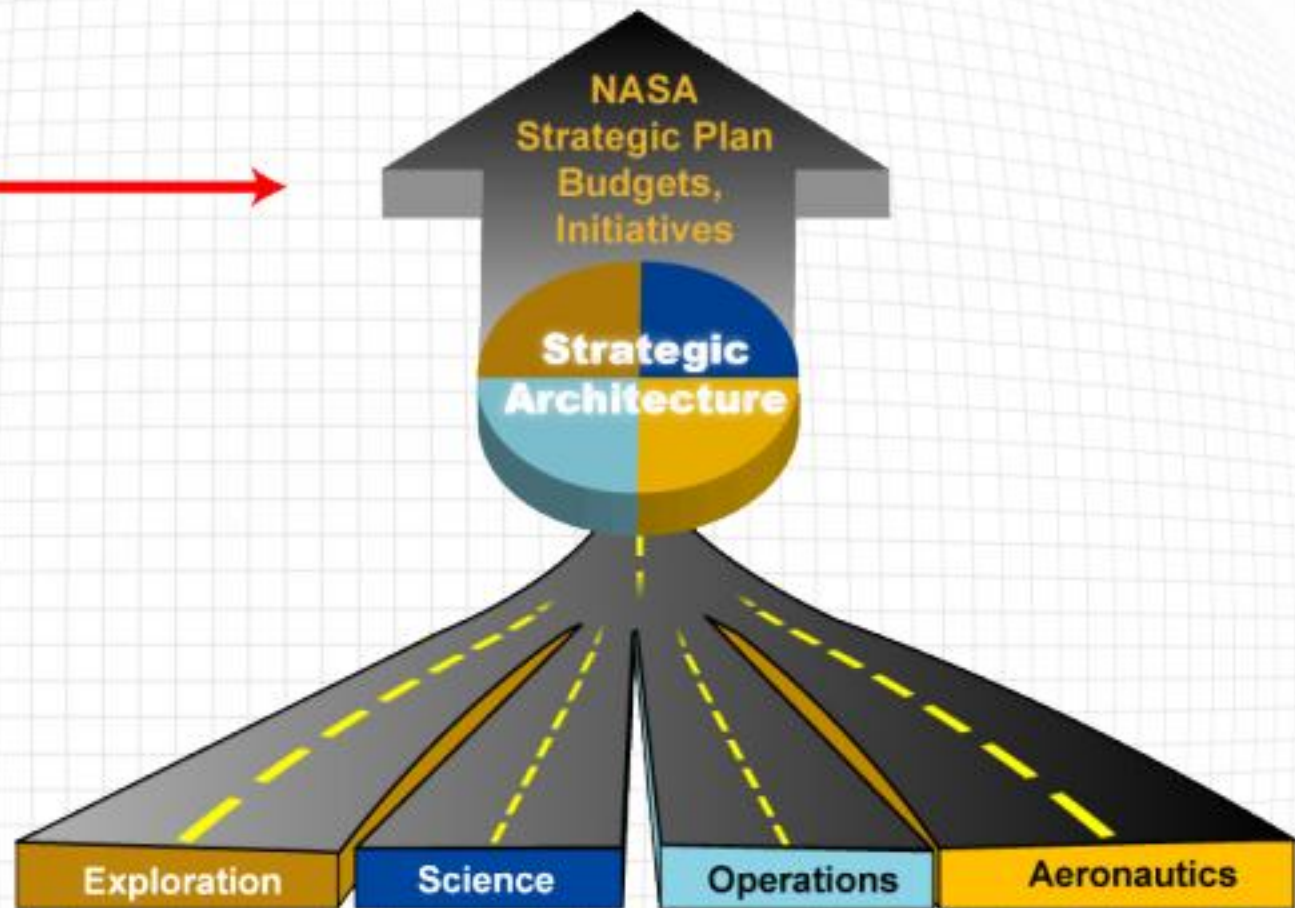**Advanced Planning & Integration Office**
November 30, 2004

Outline

- **Agency Transformation in Strategic Planning & System Integration**
  - Strategic Planning Transformation
  - Advanced Planning Organizational Roles
- **Public Involvement in Strategic Planning**
- **Strategic Roadmap Development**
- **Capability Roadmap Development**
- **Process for Team Selection**
- **Breakout Sessions**
- **What Will We Do With Your Input?**
- **Ground Rules**
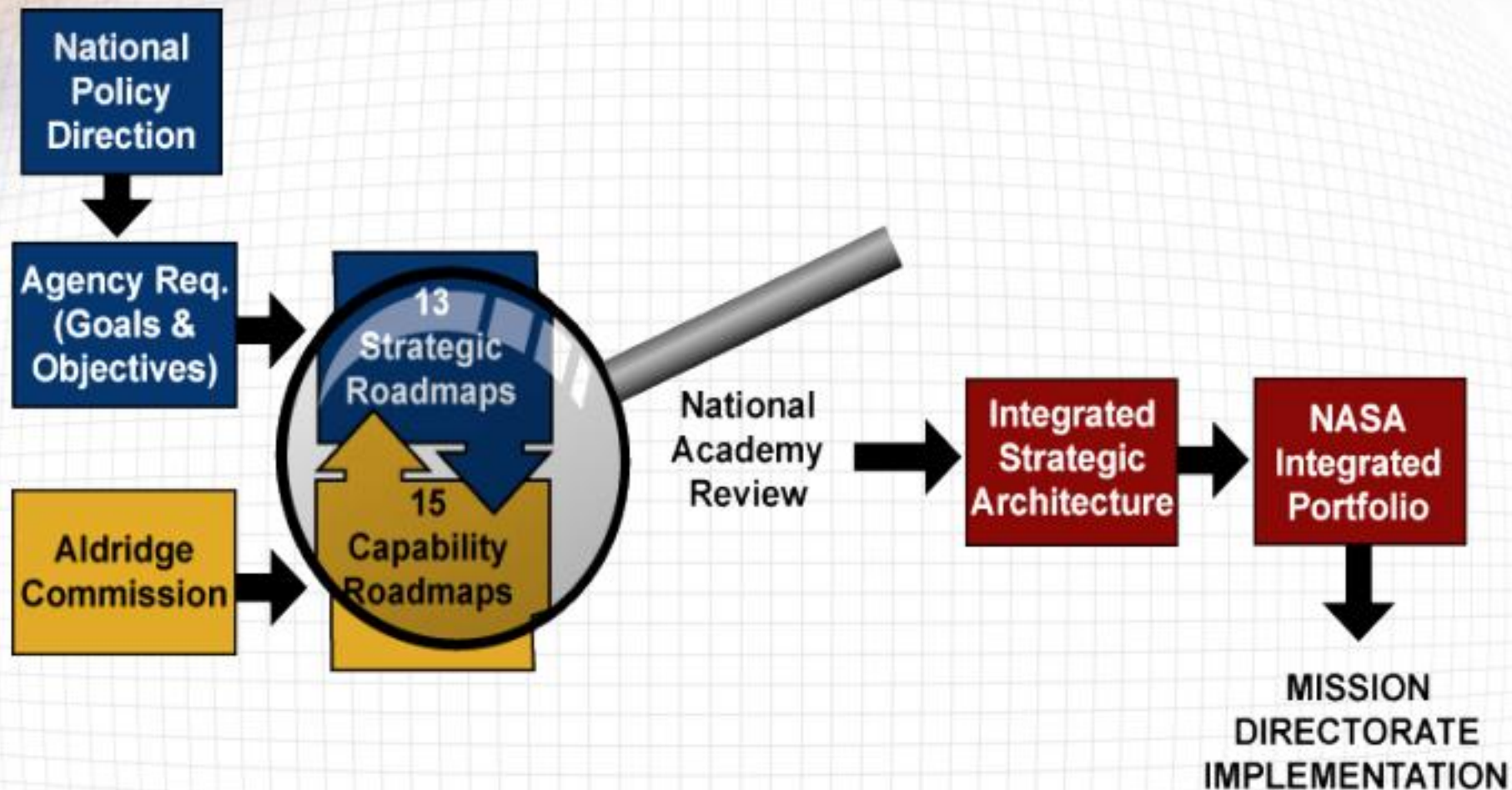
ACHIEVING THE VISION

OLD vs. NEW

NASA
Strategic Plan
Budgets,
Initiatives

Strategic
Architecture

AGENCY

Budgets, Initiatives,
NASA Strategic Plan

ENTERPRISES

Enterprise
Strategy

Enterprise
Strategy

Advanced
Planning
Activities

Advanced
Planning
Activities

Enterprise
1

Enterprise
2

Exploration | Science | Operations | Aeronautics

Capability & Strategic Roadmaps

3

4

- **NASA Strategic Planning Council**
  - Agency-level strategic decisions & NASA Strategic Plan

- **NASA Operations Council**
  - Implementation of strategies through integrated Agency tactical & operational activities

- **Director for Advanced Planning**
  - Develops input, options, & assessments for Strategic Planning Council

- **Associate Deputy Administrator for Systems Integration**
  - Tracks & assesses integrated schedules, progress towards goals, Agency needs, strategic investments

- **Advanced Planning & Integration Office**
  - Provides staff to the Director for Advanced Planning and the Associate Deputy Administrator for Systems Integration

- **Mission Directorates**
  - Technical knowledge & expertise to implement overall Agency architecture(s)

- **NASA wants:**
  - **A broad community perspective when doing its strategic planning**
  - **Best strategies and most creative and innovative ideas from across the nation to implement the Vision**
  - **To provide opportunities for community input**
    - **This public workshop (673 registered, 514 white papers submitted)**
    - **Roadmap team members drawn from NASA, Academia, and Industry**
    - **Review by the NRC Engineering Academy**
    - **Presentations to professional societies, workshops, and conferences**

Strategic Roadmaps

- **Strategic Roadmap**
  - **One of thirteen elements of the NASA Strategy that will explore options and establish pathways for implementing the Vision for Exploration.**

- **Roadmaps will include:**
  - **Broad science and exploration goals, priorities, anticipated discoveries**
  - **High-level milestones, options, and decision points**
  - **Implementation approaches, suggested missions**

CHAIRS

	Directorate	Center	External
Robotic & Human Lunar Expeditions	Steidle/ Readdy	Howell	Stafford
Mars Exploration	Diaz	Elachi	Young
Solar System Exploration	Figueroa	Hubbard	Lunine
Advanced Telescope Searches for Earth-like Planets	Asrar	Beichman	Burrows
Exploration Transportation System	Steidle	Kennedy	Bolden
International Space Station Assembly & Use	Uhran	Cabana	Betterton
Shuttle Transition to New Exploration Launch Systems	TBD	TBD	TBD

Strategic Roadmaps - continued

CHAIRS

	Directorate	Center	External
Origin, Evolution, Structure & Destiny of the Universe	Kinney	White	Flanagan
Dynamic Earth System	Figueroa	Evans	Kennel
Sun-Solar System Connection	Diaz	Einaudi	Killeen
Transform Air Transportation	Hertz	N/A	Jamieson
Educate Students & the Public	Loston	Earls	TBD
National Plan for Nuclear Systems	Steidle	Scolese	Ahearne

Capability Roadmaps

- **Capability is defined as a <u>set of systems</u> (or system of systems) with associated technologies & knowledge that enable NASA to perform a function (e.g. scientific measurements) required to accomplish the NASA mission.**

- **Capability Roadmap is a description of the development of technical capabilities (including alternate paths and options) required to support the NASA mission.**

Capability Roadmaps - continued

Capability	NASA Chair	External Chair	Coordinators	
			Directorate	APIO
High-Energy Power & Propulsion	Nainiger (GRC)	Hughes (Penn State Univ.)	Overall – Park Technical – Taylor	Bankston (JPL)
In-Space Transportation	McConnaughey (MSFC)	Col. Boyles (USAF SMC)	Overall – Park Technical – Lyles	Inman (MSFC)
Advanced Telescopes & Observatories	Feinberg (GSFC)	MacEwan (NRO)	Thronson	Coulter (JPL)
Communication & Navigation	Spearing (HQ)		Cremins Gates	Mecherle (Innocept)
Robotic Access to Planetary Surfaces	Adler (JPL)	Braun (Georgia Tech)	Thronson	Ruoff (JPL)
Human Planetary Landing Systems	Manning (JPL)	Schmitt	Overall – Park Technical – Trosper	Mueller (KSC)
Human Health & Support Systems	Grounds (JSC)	Boehm (Retired, Hamilton-Sunstrand)	Overall – Park Technical – G. Trinh	Aikins (ARC)

Capability Roadmaps - continued

Capability	NASA Chair	External Chair	Coordinators Directorate	APIO
Human Exploration Systems & Mobility	Culbert (JSC)	Taylor (University of Hawaii)	Overall – Park Technical – Mankins	Inman (MSFC)
Autonomous Systems & Robotics	Zornetzer (ARC)	Gage (DARPA retired)	Thronson	Aikins (ARC)
Transformational Spaceport/Range	Poniatowski (HQ)		Cremins/Gates	Skelly (KSC)
Scientific Instruments/Sensors	Barney (GSFC)	Zuber (MIT)	Thronson	Bankston (JPL)
***In Situ* Resource Utilization**	Sanders (JSC)	Duke (Colo School of Mines)	Overall – Park Technical – Mankins	Mueller (KSC)
Advanced Modeling, Simulation, Analysis	Antonsson (JPL)	Gombosi (Univ of Mi)	Thronson	Aikins (ARC)
Systems Engineering Cost/Risk Analysis	Cavanaugh (LaRC)	Wilhite (Georgia Institute of Technology)	Overall – Park Technical – Hwa	Regenie (DFRC)
Nanotechnology	Hirschbein/Dastoor (HQ)	Lagoudas (Texas A&M)	Thronson	Crooke (GSFC)

Capability Roadmaps Schedule

MILESTONE	DUE DATE
Capability Roadmap Teams Formation	Nov 2004
Community Workshop	Nov 2004
Working First Drafts of Capability Roadmaps	Nov 2004 – Mar 2005
Review with Strategic Planning Council	Jan 2005
Engineering Academy Dialogues - Phased	Feb 2005 – Mar 2005
Identify Potential New Initiatives	Apr 2005
Strategic Roadmap Drafts	Feb 2005 – Apr 2005
Align Capabilities with Strategic Roadmaps	Apr 2005 – June 2005
Engineering Academy Summary Review	June 2005 – Aug 2005
Brief Strategic Planning Council	July 2005
Finalize Roadmaps	Aug 2005 – Sept 2005

Process for Team Selection

- **Guidelines for Advanced Planning**
  - Small teams of 12 -15 members with participation from:
    - ✓ 1/3 Industry
    - ✓ 1/3 NASA, JPL, & other Govt. Agencies
    - ✓ 1/3 Academia

- **Strategic Planning Council assigned roadmap to Mission Directorate**

- **Mission Directorates assigned a NASA Chair with roadmap expertise**

- **NASA Chairs chose team members from industry, academia, other Government & within NASA who are recognized experts**

Breakout Sessions

Capability Focus Area	NASA Chair	APIO Facilitator	Room
High-energy Power & Propulsion	Nainiger (GRC)	Bankston (JPL)	Senate
In-space Transportation	McConnaughey (MSFC)	Saunders (LARC)	Chinese
Advanced Telescopes & Observatories	Feinberg (GSFC)	Coulter (JPL)	New York
Communication & Navigation	Spearing	Mecherle (Innocept)	Massachusetts
Robotic Access to Planetary Surfaces	Adler (JPL)	Ruoff (JPL)	Virginia
Human Planetary Landing Systems	Manning (JPL)	Mueller (KSC)	Virginia
Human Health & Support Systems	Grounds (JSC)	Tanner (HQ)	Rhode Island
Human Exploration Systems & Mobility	Culbert (JSC)	Inman (MSFC)	New Hampshire
Autonomous Systems & Robotics	Zornetzer (ARC)	Aikins (ARC)	Pennsylvania
Transformational Spaceport/Range	Poniatowski (HQ)	Skelly (KSC)	Maryland
Scientific Instruments/Sensors	Barney (GSFC)	Capps (JPL, Ret)	Grand Ballroom
In Situ Resource Utilization	Sanders (JSC)	Bauer (HQ)	New Jersey
Advanced Modeling, Simulation, Analysis	Antonsson (JPL)	Varsi (HQ)	Cabinet
Systems Engineering Cost/Risk Analysis	Cavanaugh (LaRC)	Regenie (DFRC)	Georgia
Nanotechnology	Hirschbein (HQ) Dastoor (HQ)	Crooke (GSFC)	North Carolina

- **NASA Chairs will present a brief overview of the capability**

- **Breakout Session presentations based upon white papers submitted**

- **Participants who didn't submit white papers can submit written feedback on form provided**

- **The goal of the session is to hear public input to the roadmap development process with goal of ensuring that best and widest set of ideas is considered in formulating plans for the future**

What Will We Do With Your Input?

- **White Papers will be presented to the capability roadmap teams for consideration during capability roadmap development**
  - Papers will be presented today at the workshop, but may require follow up at a later date
  - Papers not presented today will be reviewed and authors may be called upon at a later date to present their papers to the team
- **Upon completion of this year's capability roadmaps (Sept 2005) final products will be posted to the NASA website**
- **Capabilities roadmaps will be become part of the Integrated Strategic Architecture and become requirements for specific future missions**

■**Plan to handle questions:**

- **All programmatic, strategic roadmap, & policy questions should be addressed in the plenary at the beginning or end of today's workshop**

- **The purpose of the breakout sessions are to receive your input on capabilities that you think NASA should consider during its strategic planning**

- **Only technical questions should be addressed in each of the capability roadmap breakout sessions**
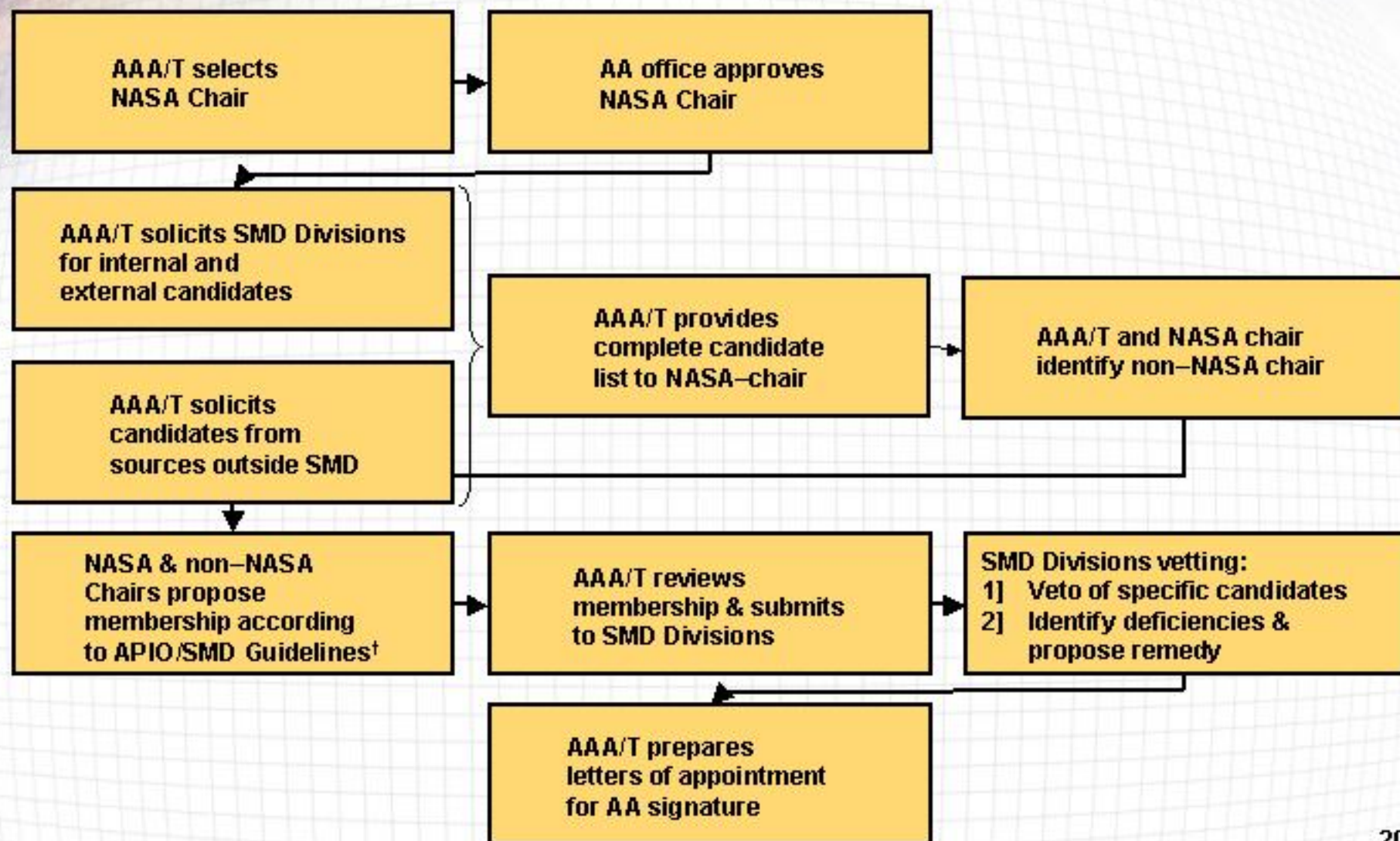
BACKUP SLIDES

AAA/T selects
NASA Chair

AA office approves
NASA Chair

AAA/T solicits SMD Divisions
for internal and
external candidates

AAA/T solicits
candidates from
sources outside SMD

AAA/T provides
complete candidate
list to NASA–chair

AAA/T and nasa chair
identify non–NASA chair

NASA & non–NASA
Chairs propose
membership according
to APIO/SMD Guidelines†

AAA/T reviews
membership & submits
to SMD Divisions

SMD Divisions vetting:
1] Veto of specific candidates
2] Identify deficiencies &
propose remedy

AAA/T prepares
letters of appointment
for AA signature

Achieving the Vision

VISION

OLD vs. NEW

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Stategic Plan
Budgets, Initiatives

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Exploration — Science
Capability &
Strategic
Roadmaps
Operations — Aeronautics

Strategic Roadmaps Schedule

MILESTONE	DUE DATE
SPC approval to proceed	Aug 2004
SPC approved Co-Chair Candidates	Sept 2004
Co-Chairs signed up	Nov 2004
Complete team formation	Nov 2004
Team mid-term status	Mar 2005
Roadmaps for NRC review	Apr 2005
NRC reviews received	June 2005
Roadmaps complete	July 2005

- **Advanced planning takes the strategy & turns it into system-of-systems level requirements**
  - Provides the foundation for implementation

- **Key Elements**
  - Agency vision
  - Setting strategic goals & objectives
  - Understanding environmental factors
  - Strategic & Capability Roadmaps (path to objectives)
  - Determination of over-arching Agency architecture

The Next Slide is an alternative way to show integrated capabilities/organizations, with HQ in the middle, instead of the top. This could replace slide 4 or 16
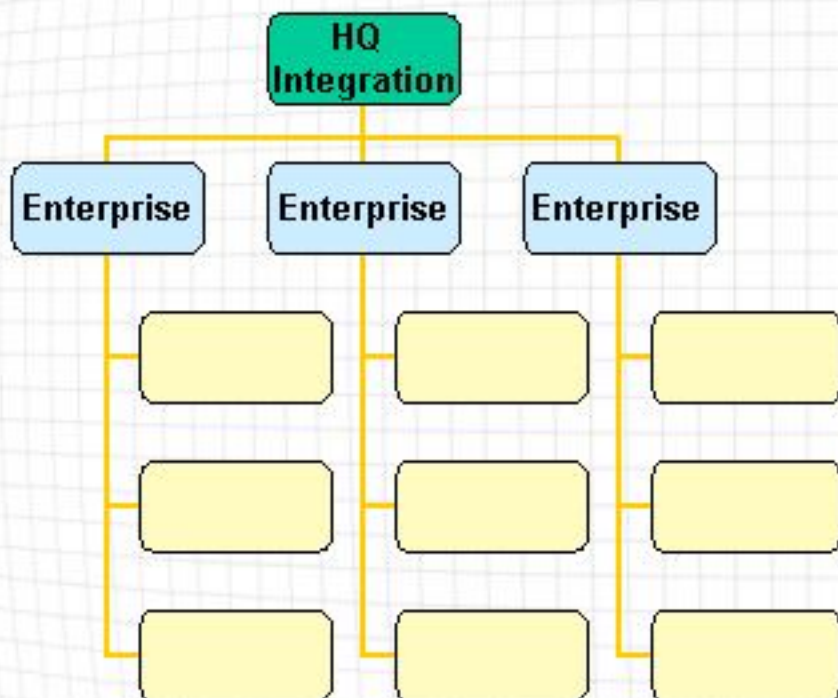
If it works, I'll redo it
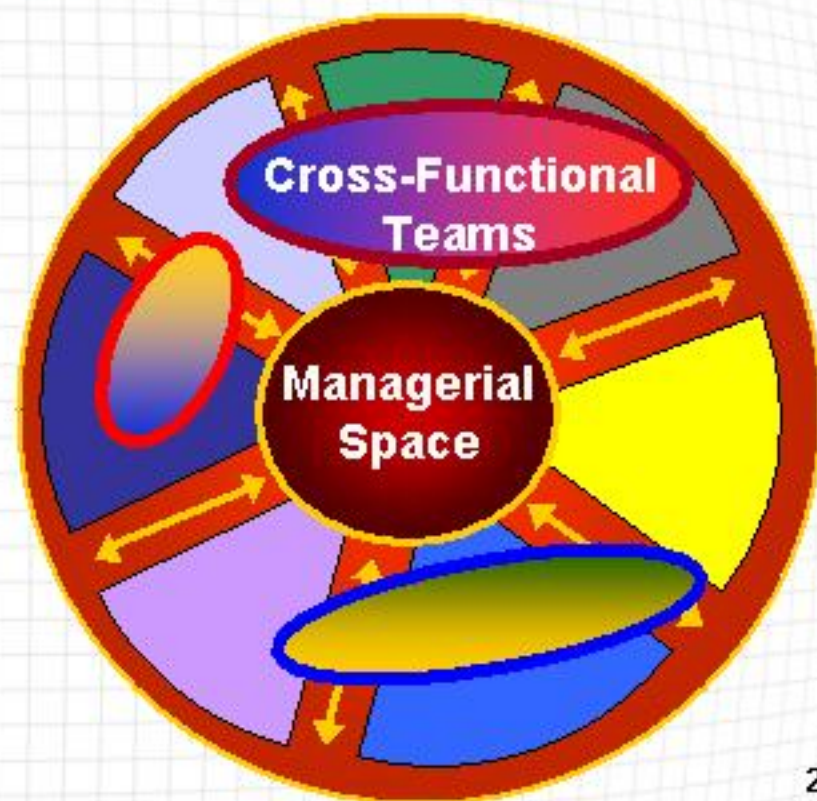
Integrating & Managing Dependencies
Between Strategic & Capability Roadmap

Old Functional Integration Paradigm

New Integration Paradigm

HQ Integration

Enterprise   Enterprise   Enterprise

Cross-Functional Teams

Managerial Space

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